II. *An Account of the Nature and Differences of the* Juices, *more particularly, of our* Engliſh *Vegetables. By Dr.* Martin Liſter, *Fell. of Coll. of Phyſ. and R. S.*

SIR,

THESE were ſome Papers, which belong'd to a Treatiſe of Vegetation; they were moſt of them made about Thirty Years ago; but as I cannot now attend the finiſhing of them, ſo I would not loſe them; and therefore recommend them to your Care, ſuch as they are. 'Tis poſſible I may trouble you with more of them, if theſe are not ſlighted; you will eaſily pardon me, if I have a fondneſs for Papers of my Youth, more than they deſerve,

Your Humble Servant,

M. Liſter.

We proceed to ſet down the Nature and Differences of the Juices of Plants: And firſt we obſerve, That moſtly Juices Coagulate, whether they be ſuch as are drawn from the Wounds of a Plant, or ſuch as do ſpontaneouſly exudate; and yet even that Exudation ſeems to be often accidental too, that is, by Cancer, or ſome other ſuch like chance.

And yet I am uncertain what to think of the ſmall purple Blebs and Veins, to be obſerved more or leſs on all the Hypericum kind, and on the Threads of the Flower, and the Hairs which cover the Leaves of *Rorella* in like manner. I doubt much, whether this may properly be called an Exudated and Coagulated Juice, or no? Our Obſervations of thoſe of this Tribe, are what follow.

Hypericum.

Rorella.

Purple Juice.

The ſmall green Leaves, next encompaſſing the Yellow Flowers of *Androſæmum Hypericoides Ger.* are ſet with very ſmall round Blebs, full of a purple Juice; as are likewiſe, but with two or three only, the very points or tops of the yellow Leaves themſelves: Yet the Stalk cut, doth not to the Eye, diſcover any ſuch diſtinct Veſſels, carrying that purple Liquor; which makes me ſuſpect, it is ſeparated by Coagulation from the reſt of the Juice, and reſerved in thoſe ſmall Bags.

Hypericum Ger. The purple Juice yielding Blebs, in this Plant are upon the edgings, on the out-ſide of all the Leaves. Alſo the Stalk, tho' round, hath a double edge, on each ſide one; and the Blebs or Bags, tho' but thinly, are yet obſervable on theſe very *riſing* edges too of the Stalks. As for the yellow Flowers themſelves, the outmoſt green Leaves next, and immediately incompaſſing them, have but a few purple Stripes; but the yellow Leaves or Flowers are edged with ſmall purple Bags on the one ſide, and ſtriped with Purple-juice-yielding-veins, on the other. Laſtly, on the very tops of each Thread in the Flower, is one ſingle purple Bag.

Hypericum Aſcyron dictum caule quadrangulo, J. B. In like manner, all the edges, on the out-ſide of all the Leaves, from one end of the Stalk to the other, of this Plant, are very thick, ſet with purple Bags. Alſo in the Flower, all the Threads have one ſingle Bag on the top; but the Flowers or yellow Leaves, and the green ones encompaſſing them, have very few purple Spots or Streaks viſible.

Hypericum Pulchrum Tragi, J. B. only the yellow Flower-leaves, and thoſe green ones which next encompaſs them, are thick edged with purple Blebs.

If this purple Juice be Coagulate, it is referrable to the next ſort of Juices, *viz.* thoſe which cake altogether. *Qu.* Whether it be Clammy too?

Divers parts of the ſame Plant have divers Faculties, *V. C. P. A. in App.* 330, & 42. I add, That divers parts of the ſame Plant yield, from the ſame Veins, different Coloured Juices, *v.g.* the Milk in the Root of *Spondilium Ger.* is of a Brimſtone Colour, but in the Stalk White: Yet I make a Queſtion, if the Juice of the Leaves of *Betonica*, in Spring, will not Work by Vomit and Seat as well as the Roots, which ought to be tryed.

Juices ſpontaneouſly breaking with a Whey.

Amongſt thoſe Juices which Coagulate and are Clammy, ſome there are which readily break with a Whey.

Lactuca ſyl.

In the middle of *July*, I drew and gathered of the Milk of *Lactuca ſyl. coſta ſpinoſa, C. B.* and of all our *Engliſh* Plants, that I have yet met with, this moſt freely and plentifully affords it. It ſprings out of the Wound thick as Cream and Ropes, and is White, and yet the Milk which came out of the Wounds, made towards the top of the Plant, was plainly ſtreaked or mixt with a purple Juice, as though one had daſhed or ſprinkled Cream with a few drops of Claret. And indeed, the Skin of the Plant thereabouts was purpliſh alſo, perhaps with Veins. Again, in the Shell I drew it, it turned ſtill yellower and thicker, and by and by curdled, that is, the white and thick caſeous part did ſeparate from a thin purple Whey. So the Blood alſo of Animals, whilſt warm remains liquid and alike. but ſo ſoon as cold, it cakes and has a *Serum* or Whey ſeparated from it; the Cake is made of glutinous Fibers, and therefore if the hot or new drawn Blood be well ſtirred or beaten, it will not break. *Qu.* If the ſame ſtirring the Milk for *ex.* of *Lac. ſyl.* in drawing it into the

Shell, will hinder its coagulating or parting with a Serum or Whey ? alſo, the caſeous part of the Milk of Animals is glutinous and ſtringy. Further, this *Serum* came freely from the other, by ſqueezing betwixt my Fingers: and the Curds I waſhed in Spring water, which became immediately like Rags and tough (Draw this Milk immediately, or let it fall off the Plant, into a Shell of fair Water, or other Menſtruum, as Vinegar, *S. V.* Spirit of Vitriol or Sulphur, *&c.*) and remained ſtill white and dry. As for the purple Whey, after a Days inſolation, it ſtifned and became hard, and was eaſily formed into Cakes; which Cakes were yet very brittle, and would eaſily crumble into Powder. About *December* following, I broke one of the Cakes, made of the caſeous part of the Milk of this Plant; it then proved very brittle, and ſhined upon breaking like Roſin; it was then of a dark brown Colour; moreover, it burned with a laſting Flame, like Roſin or Wax; and that being melted by Heat, it would draw out into long tough ſtrings, like Bird-lime. On the contrary, the purpliſh Powder, which was the Whey, if put into the Flame of a Candle, would ſcarce burn with a Flame at all, but ſoon be turned into a Coal. Laſtly, the purple Powder did taſte very bitter; whereas the caſeous part was as inſipid as Wax.

Purple Whey.

Qu. Whether the Artifice of Bees doth not much conſiſt in a way Nature has taught them, to coagulate the Juice of Plants, or rather to ſeparate and make choice of the caſeous part of the Juices of Plants, already coagulated for their Wax, and the Whey for Honey.

Trachelium.

The Milk alſo, which the Trachelium kind plentifully yields, (I made tryal of four Species of them, *viz Campanula rotundifolia Ger. Trachelium maius ejuſdem,* *Brown Whey.*

dem. Trachelium minus ejuſdem. Trachelium majus Belgarum Park.) is very thick, and preſently curdles ; the ſerous part or Whey being of a brown Colour. Theſe Juices ſmell ſower, ſomething like the ſlices of green Apples, which have been long cut.

Tithymalus.

Cleer Whey.

The thin Milk of *Tithymalus helioſcopius Ger.* ſprings freely and plentifully, it ſprings the faſteſt of any Plant I know with us ; it is very clammy upon the Fingers ; it is very white in drawing ; it turns upon a Lancet, of a dark Blewiſh ; and indeed, it is both of the Colour and Conſiſtence of blew Skimmed Milk : Made up with Wheat Flower into Cakes, it ſhews it ſelf greaſie or oily, and ſcarce ever dries. It very hardly breaks or coagulates. I kept ſome of it pure and unmixt, in little Eſſence Bottles, ſtopped lightly with Cork only ; in theſe it broke in Proceſs of time, and the Curds were eaſily to be formed into Cakes, which Cakes burned with a laſting flame, and being melted drew forth into Strings like Wax ; the Whey was clear and like fair Water. This broken Milk in all my Bottles was very corrupt and ſtinking. Q. What things are there, which may haſten the breaking of Juices ? Whether to ſuffer them to ſower in a Veſſel of Wood for Example, and then putting freſh Taped Juice therein, will cauſe any ſudden ſeparation ? What reſpective coagulum one ſort of Juice may be to another, by being mixt with various Circumſtances ? Whether Rennet of Calfe or Hare, &c. or the Flowers of Carlina, &c. will have any certain effect here, as upon the Milk of Animals ? Another inſtance of Corruption ſeparating the Juices of Vegetables, I find in *Cat. Plant. Angl. pagin.* 331. by burying under Ground for a Year, a covered Earthen Pitcher, well filled with the Leaves of Elder ; you'll find (it is there ſaid) a Cruſt at top, and Oyl in the bottom of the Pot. Laſtly, The Cakes I made up of this Juice, with Wheat-flower, and a little Gum Arabick, dryed well and kept ſweet.

Other clammy Juices there are, which do not let go a Whey when they Coagulate, but cake altogether.

Juices Caking and not letting go their Whey. And for this purpoſe we are to examine the Natures of the Juices of the Hieracium kind, Thiſtles and Burdock, *Clematis daphnoides minor, J. B.* Onions and Garlick, *Ficus, Aceris turiones.*

Hieracium. Carduus. Bardana. Clematis daph. Cæpe. Sonchus. Papaver.

I made Cakes of the ſole or unmixt Juice of *Sonchus lævis & aſper*, without any addition, and it parted not with any Whey.

Papaver rheas Ger. Bleeds freely a white Juice, and the heads or Seed Veſſels, when the Flower is gone, do yet Bleed. I obſerved, that in gathering it into Shells, it preſently turned its white Colour into a yellow one, inclining to an Orange. At firſt Springing it roaped or was but little clammy, and ſeemed to be very Liquid and Dilute, yet it did not part with any Whey, but grew ſtiff ſoon, and is very Reſinous and Oily.

Note, The Milks or Juices of Plants, ſeem to be Compounded and Mixt of Liquors, of different and perhaps contrary Qualities; ſo that it is probable, if the caſeous part ſhall be Narcotick, for Example, the Whey may not be ſo; or the one may be hurtful, and the other a good and uſeful Medicament.

Tragopogon. *Tragopogon flore luteo, J. B.* yields a Juice, which upon the firſt ſpringing from the Wound, is white and thick, but immediately it turns yellow, and then redder and redder; it is of no unpleaſant Taſte; it is ſomething glutinous and very Oily, and parts not with much, if any Whey, and therefore it is eaſily formed into Cakes alone.

Convolvulus major, *J. B.* bleeds freely a white Juice, as I Experienced in the middle of *Auguſt*; not only the Stalk and Leaves, but the white Flowers alſo in proportion, bleed as plentifully as any part elſe. This Milk is very ſharp, *Qu.* If it be not Purgative?

Convolvulus.

After our Notes upon white Juices, which Cake without parting with a Whey, we will inſtance in one of the like Nature, which is of a Saffron Colour, the which *Chelidonium majus Ger.* wounded, freely affords; this Juice breaks not with a Whey, but is eaſily formed into Cakes, and ſtiffens in the Sun; it is thick, and of the Conſiſtence of Cream, upon the ſpringing forth of it, of the Wound.

Chelidonium majus Ger.

There is another very Clammy Juice, which is of a golden or yellow Colour, upon Drawing; and this is the Seed Veſſels of *Centaurium luteum perfoliatum C.B.* in *July*, and after, even when the Seed therein contained are turned black and ripe, yield plentifully and freely enough. (Theſe Juices, which the heads or Seed Veſſels of Plants afford, may be thought of the ſame nature, with thoſe Juices which the pulp of Fruits afford; the pulp of Fruits, and theſe exterior Veſſels being parts equivalent, that is, Apples for Example are nothing elſe but the Seed Veſſels of their Kernels.) It is Liquid upon firſt Drawing, and after a while it thickens, parting with no Whey; (*N. B.* I call this Coagulating too) and this is of the Colour of Amber: It ſticks to ones Fingers, and pulls forth into threads like Bird-lime; it would never become harder then very ſoft Wax, and that by being dryed in the Shade only; for if never ſo little expoſed to the heat of the Sun and Fire, it ſtreight-way became exceeding

Saffron coloured Juice.

Centaurium luteum perfoliatum, C. B. Yellow Juice.

Soft Cakes.

exceeding ſoft. But as for the Cakes I made up of it and Wheat Flower, them I found in my Cabinet in Winter, very hard and firm, and the unmixt Cakes ſtill ſoft. Theſe burn with no unpleaſant ſmell; they emit a laſting Flame; they ſtill keep their Amber-colour; and draw out in Threads in Burning like Wax.

To this laſt Coagulate and Clammy Juice, and which will not much harden, we may add the yellow Juice, which the Wounds of *Angelica ſativa Park.* yield; it will not harden by inſolation or long keeping (for I have had an Eſſence bottle of it by me this two Years) yet I perceive it ſtiffens and will draw into Threads.

Examine the Nature of the Juice of Fennel and other ferulaceous Plants, *Qu.* Whether their Juices do not coagulate after the ſame manner.

Gums.

Liquid and perhaps inflamable.

Hard Gum, not taking Flame.

The next ſort of coagulate and clammy Juices, we have taken notice of are Gums; and ſome of them ſeem long to abide Liquid. Whether theſe are Inflamable or no, I leave for future tryal, having not yet made the Experiment my ſelf: others there are which grow hard, and are certainly not to be kindled into a Flame.

They are eaſily to be diſſolved in Fountain Water, (the Gum of Rhubarb and the Leaves, for Example) and do ſparkle when put into a Flame; which two Natures argue a ſerous or wateriſh part in them: Again, put into a Flame, they melt and become as it were Liquid and Ductible; which ſhews the caſeous part in them; and becauſe they will not flame, it is an Argument of their leanneſs and ſcarcity of Oyl. All three put together plainly evince, Gums to be coagulate Juices.

Qu. Whether this Gum comes from the Fruit, or from the Leaves and Stalk? And if from the latter, whether any part of the Tree (as Body, Root, or Branch) will ſpend it, being purpoſely Wounded, and in what Seaſon, *&c.*

The Inſtances I have to ſet down of either, are as follow:

In *Auguſt* I have obſerved the Cluſters both Green and Ripe of *Periclymenum Ger.* very Leaky; which upon nearer and heedful Inſpection, I found to be a thin clammy Juice, or Liquid Gum, which falls down upon the Leaves, and keeps its Liquid Form there. *Periclymenum.* *Liquid Gums.*

Here the Purple Juice ſeems to be a Whey ſeparated from the liquid Gum; but I am of Opinion it's a diſtinct Liquor.

Again, the red Threads of *Rorella* end, or are toped with little Bags; which being compreſſed do yield a Purple Juice (as we above Noted in the *Hypericum*) and thoſe ſmall Buttons on the very tops of thoſe Threads, are encompaſſed with ſmall Tranſparent Pearls or Drops of a liquid Gum. They abide in this Form the hotteſt Summers Day like Dew, whence alſo the Plant has its Name; and upon the leaſt touch cleave to your Fingers, and draw out into long Threads like Birdlime. *Rorella.*

In like manner a liquid Gum (but that it ſtands not upon ſo long Threads, and is much thicker bedewed) you may obſerve upon *Pinguicula*. *Pinguicula.*

Note well, That the ſmall Drops and Threads, or Hairs, in either of theſe two Plants, are to be ſeen upon the uppermoſt or inmoſt ſide of the Leaf, and the outmoſt and undermoſt is ſmooth or void of them, which is ſomething contrary to all other Plants I have obſerved.

Alnus Quercus. My-thoughts I obſerved about Mid-*Auguſt*, the Chats of the Alder to be Gummy.

Qu. Whether it did not exudate from the Plant it ſelf; as I gueſs the Honey fall, or Gummy Dew, to be obſerved upon the Leaves of the Oake, &c. are nothing elſe? *V. C. P. Angl.* concerning Manna gathered off the Aſh.

The next Inſtances are of Gums, which grow hard in time, readily diſſolve in Water, and are not to be kindled into a Flame, though they become thereby ſoft and ductible.

White and clear, and hard Gum. Rhabarbara. The *American* or *Indian* Rhubarb Sown in our Gardens, is the only Plant that I have met with, or ever ſaw, which yielded a Gum; and yet, becauſe it is of the very kind with our common Sorrels and Lapathums, I believe it not impoſſible, yet even from our own ſtore, Herb-Gums might ſome ways or other be had. I ſay, that of the Stalk, or indeed of the Leaves of the *Indian* Rhubarb, I have gathered an Ounce at a time in *June*, of very white and clear, and hard Gum, both in thoſe Years I obſerved to flower with us, as 1670. and in that Year it did not, 1669. It exudates from all parts of the Stalk and Ribs, on (Note well) the underſide of the Leaf it ſelf. I gathered ſome in the form of good big Drops; others, as though the Stalk had been beſmeared with it; others, ſhot into long and twiſted Wires or Icikles. Moreover I obſerved, that the cankered Orifices, or places where the Gum had burſt forth, might be followed into the Stalk with a Knife, and that through the Skin: In certain places I could ſee that the Juice within the Plant was turned Gummy, and looked clear like Ice.

It is the Experiment of Mr. *Fiſher*, that the clear and defecated Juices of moſt Plants, have more or leſs redneſs in them. *V. C. P. A. Pagin.* 325. *App.* Again, in the ſame Catalogue, *Page* 334. *App.* That the dryed Root of *Acetoſa* (a Plant of the Family with Rhubarb, which may well be called *The Indian Sorrel*, or *Sower Docken*) Boiled, doth Dye Water with a fair Red Colour. And I have obſerved, that the unripe Seeds of Rhubarb, yield a very fair and deep Purple, I mean the Husk of them. Conſider what hath been above-ſaid of *Rorella*, and the *Hypericum* Kind, concerning their Purple Juice yielding Blebs. Note alſo here, to this purpoſe what we have ſet down above, that Rhubarb and Sorrel, &c. do, when they decay, turn Red.

The Juice Extracted from the Roots of our *Engliſh* Rhubarb, by a Tincture of fair Water ſteamed away, is nothing elſe but a lean uninflamable Gum; and though it differ in Colour (perhaps from the yet woody parts in it, as being of a deep Liver Colour) from the exudating Gum; yet in other Natures, as this of being uninflamable, ductible in the Flame of a Candle, &c. it agrees with it. Qu. Whether the Extracted Juice of the *Indian* Rhubarb be more Inflamable than ours?

I may not omit, that the repeated Cuts I gave the Stalk, on purpoſe to have of the Gum that way, failed my Expectation. This Gum is ſweet, or rather of no taſte at all.

To this purpoſe I remember in Summer time, to have ſeen even the Juice of Apples ſpontaniouſly jellied in Languedoc, and the Apple to look clear and hard like Ice, whence they call that ſort of Apple *Pome Gelée*, or the *Frozen Apple*. Though indeed, it be nothing elſe but the breaking or coagulating of the Juice in ſome ſpots of it, for it is rare to ſee one of them all over ſo. Qu. Whether the tart Juice of Rhubarb will Jelly when Boiled?

We may here give a probable reaſon, why a gentle Infuſion or Maceration of Rhubarb, is a very ſure Purge, but the Subſtance or Powder of Rhubarb, or a Decoction thereof, will have a quite contrary effect and bind. We may, I ſay, think, that the ſharp and tart Juice in Rhubarb, wherein its Purging Faculty lies, is by a gentle Infuſion ſo Extracted, that it turns not to Gum in our Stomach. For I cannot think, that the ſower Juice of Rhubarb, is a ſpecically diſtinct Liquor from the Gum, which I believe to be only an accidental Coagulation.

Qu. Whether the drying of Plants do not alter their Juices? Whether a long and competent keeping of our *Engliſh* Rhubarb, will not quicken and encreaſe its Purging Virtue? Whether the Juice of dryed Plants, ſpend their Juices upon Maceration or Decoction leſſer, or more freely then green ones? What difference betwixt a Decoction or Maceration of green and dryed Plants?

Prunus.

Green Plumbs or Sloes do often break forth with a Gum, which is clear and tranſparent, and it ſeems to haſten if not ripen, at leaſt the red Colour. I have cut them, to the end that I might have gathered Gum in the Wounds, which, indeed I did; but yet long after, when the Wounds ſeemed to be Cankered, and that but in a ſmall quantity to what they voluntarily ſpend.

Lauro-ceraſus.

Lauro-ceraſus, a beautiful Winter Green, which we have adopted to adorn our Court-Walls with, yields a clear Gum very plentifully: It is very white and very clear.

Qu. At what time of the Year, in this or any other Plant, the Gum may be drawn, whether in Spring only, or in Autumn alſo?

There are other ſorts of Juices, which will not of themſelves, that I have obſerved, exudate out of the Wounds of their reſpective Plants; and of this ſort of Plants is the Holly.

Lime or ſtringy Juice.
Agrifolium

I wrentched and Wounded the Holly the latter end of *March*; and yet after ſome Days of warm and open Weather, I could not perceive the leaſt ſtirring of Juice. The latter end of *May*, the Bark begins to be full of Lime, which you may try, by preſſing a piece of it between your Fingers, and when you would take them off, the Juice or Lime draws out into Heirs, and follows your Fingers, cleaving to them like ſmall Threads.

V. C. P. A. App.

This Lime or Juice is ſeparated or taken out of the Bark thus; Peel off the Bark the Months of *May*, *June*, or *July*, for it then comes eaſily away, and moſt abounds with Juice: Boil the Bark in fair Water, until it be ſo tender, that the outmoſt thin Grey Bark or Membrane peel eaſily off; lay it ſo peeled, and cover it over with green Nettles or Fern, or ſuch like, *S. S. S.* in a Cellar for about ten Days, where it will ferment or rot, and become Mouldy. Take them out, and beat them well in a Mortar to a Paſte, and roul them up into ſmall Hand-balls, and in a running Spring waſh them clean, from all the woody or ſticky parts; which is effected by pulling and teaſing them. But Note well, That great care is to be taken in the waſhing of the Balls; for beſides that they muſt, if poſſible, be forthwith waſhed, the Lime will all get from you, except you ſo order the matter, by engaging with your Fingers that it entangle. You would imagine, that upon breaking one of the Balls, that there was little or no Lime in them, ſo freely they moulder and crumble. After it is once engaged throughly, it will endure waſhing; and the clearer you take away the woody parts, the better it is.

Qu. Whether the like Rotting other Barks, will in like manner ſeparate their Juices? Alſo, Whether it be not to be Experienced in the rotting of Herbs? Whether the body of Holly have any Lime in it, as the Bark?

Sambucus. In cutting the tender tops of Elder, the latter end of *May*, there will a ſtringy Juice follow your Knife, and draw out in Threads, ſomewhat like Bird-lime or the Juice of Holly: it ſeems to be in certain Veins juſt within the Circle of Teeth or Wood.

Bryonia Narciſſus, Filix. Hyacinthus Viſcus Viburnum. We are to Examine for this ſtringy Juice, the Roots of the *Hyacinthus* kind, alſo *Viſcus*, *Viburnum*, *Aſphodelus Lancaſtriæ Ger. Narciſſus ſyl. Pallidus calice luteo C. B. Bryonia tum alba tum nigra. Filix fæmina*, *&c.*

Further, the Diſſected Veins of many Plants, af- *Oily Juices.* ford us Oyl, that is, ſuch a Juice, which being rubbed betwixt ones Fingers, is not at all Clammy, but makes them greaſie and glib. Some of it ſtiffens not, as far as I have yet Experienced, yet I believe it to be coagulate and mixt. We will inſtance in the Juice of

Helenium. *Helenium ſive Enula campana J. B.* You may take it off with a clean Knife, whereon it looks like Oyl mixt with Water, that is, the thin or dilute Juice of the Plant, ſpringing up out of the Wound, together with the Oyl. The like Experiment may be made upon *Cicuta.* *Cicuta.*

Qu. Whether theſe Juices will not in proceſs of time grow ſtringy? I having once ranged the Juice of *Angelica ſativa Park.* amongſt thoſe, and yet I found it altered after a Years keeping, and grown very Limy.

Tapſus barbatus. *Tapſus barbatus Ger.* If you ſtrip off the Leaves in *June*, it ſeems to yield an Oily Juice, but very much thinned with the Watery one. It ſprings freely enough;

it is of a dark green Colour, and I took it in Wheat-flower, and made it up in Cakes.

Alſo the Fruits of many Plants afford Oiles, as *Olivæ, baccæ lauri, hederæ, Juniperi cornus fæminæ*, &c. *V. C. P. A.*

Plantarum ſemina.

The Pulp of moſt Seeds ſeem to abound with this Oily Juice and at ſome time before their Maturity, it is liquid and viſible in them, in the form of a Milk. I inſtance in

Helleborus.

Helleborus niger ſyl. adulterinus, etiam hyeme virens, J. B. The Seeds of this Plant, the latter end of *May* is very Milky, and by Inſolation is eaſily formed into Cakes, which are yet very Oily, and being long kept, I have expoſed to the flame of a Candle, which they receive, and burnt freely, ſparkling not very much, and not then neither being clammy at all. One thing I muſt not omit, that this Milk or Juice of the Seeds, is of a very fiery and ſtinging Nature; for when I cut the Seeds out of the green Pods, they ſtruck my Eyes no otherwiſe than Onion is wont to do. Moreover, the tops of my Fingers, which were wetted with this Juice, did boaken and ake, as when after extream cold, one has the *hot-ach* in them; and that pain continued in them for ſeveral Days; and at length the Skin of my Fingers end pealed off.

Diacodium album, is a Medicament of the Seeds of Poppy; to this purpoſe Examine *Dulcamara* the latter end of *May*, and *Thalictrum majus Ger.* the beginning of *June*.

Cucumer aſininus.
Elaterium.

There are doubts made concerning the way of making the beſt and Genuine Elaterium of the Antients: *Theophraſtus* and *Dioſcorides* ſeeming to differ about the marks of it. *Qu.* How the Seed alone of *Cucumer Aſininus*, taken in the Milky Seaſon will prove for good.

There are yet other Oily Juices, which after Coagulation harden, and are called Roſin; and ſuch our Ivy yields abundantly. Hither alſo may be referred the Juice of *Juniperus vulgaris baccis parvis purpureis, J. B.* which is a hard fat Juice and not much Gummy.

Roſin or hard Oily Juice. Hedera.

In the Chops of Ivy made in *March*, there did exudate a thick Matter like Barm, yellowiſh and greaſie: It melted like Oyl betwixt my Fingers, not having the leaſt clammineſs then perceivable. In proceſs of time it hardned and cruſted on the Wounds like courſe brown Sugar, it burns with a laſting Flame, and ſmells very ſtrong.

Lactuca ſyl.

Flos prunorum.

Alſo on the top-moſt Leaves of *Lactuca ſyl. coſta ſpinoſa, C. B.* in *July*, many ſmall Drops or Pearls of an Oily Juice, coagulated and hardned Roſin-like, are plain to be diſcerned, eſpecially with a ſingle Microſcope: They are of an Amber Colour and Tranſparent, eaſily to be wiped off, as being only Oily Juice exudated: And I am of the Mind, that even the blew Flower of ripe Plumbs is nothing elſe, but a fine reſinous coagulation of the tranſudated Juice.

Lapthum unctuoſum.

On the underſide of the Leaves, and all over the Stalk of *Bonus Henricus*, *J. B*, do ſtick infinite ſmall Tranſparent Pearls: Thoſe clear Drops are hard to the touch, and feel like greaſie Sand, not clammy, and therefore it was well called *Unctuoſe* by *C. B.* and we put this ſpontaneouſly exudated Juice, amongſt the reſinous Coagulations; Infuſe often in the ſame Liquor this Plant. *Qu.* Whether the Sand be Inflamable? At what time of the Year it moſt abounds? *Qu.* concerning the hoarineſs of *Vulvaria*?

And thus far we have treated of the Juices of Plants, as they are differenced, principally by that accident of Coagulation and other Natures: Now we proceed to Note our Obſervations concerning the ſame Juices of Plants, as they are varied and diſtinguiſhed, by that other accident of Fermentation.

And not only the Juices of Fruits are to be wrought or ſet a working, as of the Apple, Pear, (*V. C. P. A.* 270.) Briar, Grape, *&c.* as is well known; but there is an artificial change, *viz.* Malting, to be made even in the Seeds of Plants, ſo as to make them ſpend freely, or let go their Juices, and communicate them to common Water, and receive a ferment. Alſo the Juice of the Roots *Glycyrrhiſa* will ferment, *V. C. P. A. Pag.* 135. Alſo the Juice of the Cane, as Sugar. Again, the taped Juices of Vegetables (wherein my Obſervations are limited) are ſuſceptible of a Ferment. As for Inſtance;

The 21ſt of *April*, 1665. about eight in the Morning, I bored a hole in the body of a fair and large Birch, and put in a Cork with a Quill in the middle; after a Moment or two it begun to drop, but yet very ſoftly: Some three Hours after I returned, and it had filled a Pint Glaſs, and then it droped exceeding faſt, *viz.* every Pulſe a Drop: This Liquor is not unpleaſant to the Taſte, and not thick or troubled: yet it looks as though ſome few drops of Milk were ſpilt in a Baſon of Fountain Water. *Vide Philoſ. Tranſact.* There are many ways of Fermenting or ſetting this Juice a Working, that is, of keeping it from Coagulating. And here I cannot omit, what I have obſerved concerning the great Change, which the Juice, particularly of this Tree undergoes, by being long buried under Ground. *Pimco* is one of the higheſt Mountains in *Craven*, lying on the South ſide of that Country, ſome two Miles above *Carleton.* On the South ſide the Pike (as they call the very top of that Mountain) is a place where the Water ſtands; this is called a Moſs, and is *Betula.*

ſome Fathoms perhaps, deep in black Mud. Here are dug up, if we will believe the Inhabitants, not only Roots, but whole Trees of Fir It is true, I ſaw there no ſmall marks of a Wood in former Ages, as the Roots or Stumps of Trees appearing above Ground; but upon due Examination of the Grain and Bark, I found them to be the Roots of Birch. Theſe Roots ſplit eaſily and ſoon dry, and when dryed they burn with a laſting Flame, and for this purpoſe they uſe them upon any ſudden occaſion about their Houſes: And altho' the Flame be great, yet it is without any Reſinous ſmell. However, it ſeems, that their having lain ſo long under Ground, has prepared the Juice for burning. Examine the *Fir ſpells,* as they call them, who are brought up the River *Ouſe* by the Turff-men, and ſold at *York*.

There have been Oaks, as I have been told, dug up hereabouts alſo, but I ſaw none.

Acer majus & minus.

The Maple, both that which is miſcalled the *Sycomore*, and the leſſer, bleed a fermentable Juice copiouſly, in the break up of hard Froſts.

Salix, Juglans, Populus, Sorbus.

Alſo the Willow, Walnut, Poplar, Whicking, are all ſaid to bleed in their Seaſons a Vinous Juice.

To Extract the Juice of Vegetables, as Opium for Example (as is uſual in the beſt Preparations and Methods of making *Laudanum*) with Spirit of Wine, is not probably, to ſeparate any one part of that coagulate Juice from the other, as the Serum or Whey, (for Example) from the caſeous part of the Juice, but only to depurate or defecate the Opium: for *S. V.* ſays Mr. *Boyle*, will diſſolve *Gum Lacc. Benzoin*, and the reſinous parts of Jallap, and even of Guajacum, which are Coagulations and mixt Juices;

and the ſame we may think of the Juices that are Extracted by *S. V.* from other Herbs that they are mixt. *Qu.* Concerning Hydromel, Wine, Vinegar, *&c.* whether they can reaſonably be called ſeparating Liquors, as which will only diſſolve the Serum of a Juice.

Alſo, thoſe other ways of Roaſting and Drying Juices, upon Plates over a gentle Fire, until they will rub to Powder, gives no great ſatisfaction to me, that the Narcoſis of Opium, for Example, is gone or ſeparated, becauſe the dryed Juice leſs offends the Noſe, that is, ſmells not ſo ſtrong.

The Whey of *Lact, ſyl.* will be only diſſolved in cold Water, the Curds wholly refuſing to mix with it. *Qu.* Whether it will not ſucceed in other Juices, ſo as to make good that ſimple? Water is the beſt *Menſtruum*, and that it really ſeparates, what *S. V.* only depurates.

And thus far we have ſet down our Obſervations and Experiments, concerning the Juices of Vegetables, both thoſe which appear Coagulate, and alſo thoſe which are fermentable, and have likewiſe noted other their reſpective Natures and Differences. We are in the next place to learn by particular Experiments, what different parts, each particular Juice doth conſiſt of, and by what ways they may beſt and moſt conveniently be ſeparated.

Ways of ſeparating the parts of coagulated Juices, and even after fermentation.

III. *Epi-*